



California's Health

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A SANITARY ENGINEERING APPRAISAL OF WASTE WATER RECLAMATION*

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In this period, when adequacy of water resources has become a matter of public concern in many parts of the Country, it is natural that there should be increasing professional consideration, as well as public interest, in the potential of waste water reclamation.

There is little that is new about the problems involved in reclamation operations. It can be said with confidence that waste water reclamation can be accomplished safely and satisfactorily by the application of well-known sanitary engineering principles.

Reclamation of waste water may be accomplished by each of the following operations: ground water recharge—either by percolation from the surface or by direct injection; crop irrigation; “domestic” irrigation—particularly lawn watering in parks and golf courses; other “secondary” domestic uses—chiefly toilet flushing in institutional premises; and industrial uses.

Ground water recharge by percolation of effluent from household sewage disposal units is without doubt the oldest and most frequently occurring waste water reclamation practice. This recharge, along with effluent disposal from some community sewage disposal works, is a reclamation accomplished in most cases unintentionally as a consequence of spreading sewage on or immediately under the ground surface for final “disposal.”

Crop irrigation is another long-time use of waste waters employed largely as an aid in the disposal of community wastes, with irrigation use being merely incidental to the disposal operation. “Sewer farms,” where crops have been raised and in some cases livestock pastured, have been operated as an adjunct to sewage disposal primarily to produce revenue to partly defray costs of disposal. Unfortunately, in many cases successful disposal suffered because of a concern for the agricultural operation. In such cases, sewage was released from the sewer farm so as not to damage crops by further application of the water.

Industrial reclamation is the next in importance in terms of both historical development and magnitude of application. Two well-known examples are the Bethlehem Steel Company Plant at Sparrow's Point, Maryland, using domestic sewage effluent from the City of Baltimore, and the Kaiser Steel Company Plant at Fontana reclaiming industrial and domestic wastes from the plant.

“Secondary domestic” uses limited generally to lawn watering and toilet flushing are, with a few notable exceptions, relatively recent developments and are few in number. Some of the earliest “secondary” domestic operations have been in the Far West. These include: Grand Canyon National Park, City of Pomona, San Diego State Teachers College and Golden Gate Park, San Francisco.

Water reclamation through recharging ground water basins may also be accomplished by injection of reclaimed waters directly into porous

strata, water bearing or potentially water bearing. This has been little applied at present, but it is receiving serious consideration in some areas and may become an important means of waste water reclamation in the future. Interest in waste water reclamation at the present time is centered particularly on direct industrial reuse and on indirect reuse through recharge of ground water basins.

In planning waste water reclamation projects, two considerations will override all others; these are public health and economic. Waste waters will not be reused if the cost of the reclaimed water is greater than the cost of water obtained from other sources. Moreover, no project can be tolerated if it will result in a significant hazard to the public health. By application of sound and well-established sanitary engineering principles, all of the above listed methods of reclamation can be, and have been, accomplished without hazard to public health.

In general, when domestic sewage is involved, the more direct the reuse and the closer the human contact with the reclaimed wastes, the greater becomes the public health concern. In any reclamation project there is some element of risk of public health hazard. This concern stems from the fact that domestic sewage may be infectious because of the presence of pathogenic organisms, including bacteria, viruses, intestinal worms, or protozoa. Moreover, certain industrial wastes may contain materials toxic to human beings. Because such risks exist, it seems reasonable to enunciate the

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principle that waste water reclamation involving domestic sewage must be established as necessary and in the public interest before a decision is reached to establish a project.

Recharge of Underground Strata

Recharge of underground strata by waters percolating long distances through the ground has in many instances been accomplished without hazard to the public health. Conversely, recharge of ground water basin by injection of degraded waters directly into water bearing strata may be hazardous. Limited but significant information is available on the travel of pathogenic organisms through geological formations.

Most of the information available concerns the travel of bacteria. Little is known about travel of pathogenic viruses. Within this limited framework it is possible to draw a few important conclusions: the travel of bacteria is limited to about 250 feet in the water table in sandy formations; farther in coarse formations; farther when introduced directly into the water table; and travel is vertical in dry, homogeneous, porous formations. Viruses will travel farther than bacteria, and all other pathogenic organisms will probably travel lesser distances than will bacteria. It is certain that injection of contamination directly into the ground water table presents a greater hazard than surface recharge. The material being injected must for these reasons be treated adequately before discharge to render it relatively innocuous.

Recharge by injection must in California not be in conflict with the "Sewer Well Law." Section 4458 of the California Health and Safety Code states: "No person shall construct, maintain, or use any sewer well extending to or into a subterranean water bearing stratum, that is used or intended to be used as or is suitable for a source of water supply for domestic purposes. Sewer well as used in this section includes all of the following:

- A. Any hole dug or drilled into the ground and intended for use as a water supply which is abandoned and is being used for the disposal of sewage.
- B. Any hole dug or drilled into the ground used or intended to be used for the disposal of sewage."

Further, Section 5410 of the California Health and Safety Code defines

sewage as follows: "'Sewage' means any and all waste substance, liquid or solid, associated with human habitation, or which contains or may be contaminated with human or animal excreta or excrement, offal, or any feculent matter."

Although large scale experiments in injection of sewage effluent from the Hyperion Plant of the City of Los Angeles have been successfully conducted by the Los Angeles County Food Control District, no permanent projects for direct injection have been established in California. Hence, there has not as yet been a determination as to what will constitute compliance with Section 4458 of the Health and Safety Code. The major problem is to determine legally when reclaimed waste waters are no longer "sewage." A corollary question is, does a recharge operation constitute a "disposal"? These questions are unanswered and will require both legal and engineering decisions as yet not made. The primary objective of the law is, of course, to protect the ground waters, and interpretations should be made in the light of this objective.

All ground water replenishment projects, whether by surface application or by injection, will be affected by the percolation capacity of the formations receiving the water. The capacity of formations to percolate water may be reduced because suspended particulate matter may clog pores and dissolved materials, both organic and inorganic, will promote biological growths (generally called slimes) which physically clog formations. Moreover, "chemical clogging" may occur from changes in soil particles caused by chemical interaction between the dissolved chemicals in the applied waters and the soil itself.

It is doubtful if the public will accept recharge of water bearing strata from which their domestic supply is derived unless the injection is separated from water supply wells by a sufficient distance to allow both time of travel and dilution with natural waters in the ground water basin. In no other planned reclamation is sewage being reclaimed for unlimited domestic uses. Therefore, the public may be expected to be particularly sensitive and special restrictions and safeguards appear justifiable.

Crop Irrigation

The use of reclaimed domestic sewage for agricultural purposes may or

may not result in serious public health problems depending upon the crops on which such waters are applied and on the amount of treatment such waters receive prior to application. It is widely considered that uncooked vegetables irrigated with sewage will transmit disease. An extensive review of the effect of sewage on food crops as related to disease transmission has been made by Rudolfs and his associates at Rutgers University. The California State Board of Public Health many years ago recognized this problem and dealt with it because in California sewage has long been utilized to irrigate certain crops. Sections 7897 to 7901 of the California Administrative Code, Title 17, have been promulgated by the State Board of Public Health.

In essence these regulations state that undisinfected sewage, as measured by the coliform test, shall not be used on food crops which may be eaten raw, and further, sewage effluents should meet certain relatively high bacteriological standards for unrestricted crop irrigation. These standards apply most obviously in cases of direct use of sewage effluents. A question difficult to answer is, what limitations are necessary on irrigation use of natural waters contaminated by upstream discharges of sewage? This paper will not attempt to answer this knotty question, since this type of reuse is considered to be outside of the scope of this paper. There should be no question, however, that stream waters containing sewage poorly treated, only partially diluted and not significantly changed in character by time of travel would not be safe for use on food crops.

There has been some professional engineering criticism of the strict bacterial standards set by these regulations for unrestricted crop irrigation. Experience in California, however, shows that reclamation by means of crop irrigation can be planned and accomplished by growing crops not intended for human consumption without adversely affecting the economy of the reclamation project. Thus, there appears to be little necessity for accepting the risks of the application of a possibly unsafe waste water on "truck" crops. All crops irrigated in California at this time meet the limitations in the regulations on kind of crop irrigated.

Industrial Use

Industrial uses of reclaimed waste water vary greatly in character and hence a comprehensive discussion of the public health problems associated with uses of wastes containing human sewage can be presented only in general terms. Three kinds of problems appear to be of major importance. These are: possibilities of accidental individual use of reclaimed sewage, accidental interconnection of secondary water piping with domestic water piping, and various kinds of worker "contact" with contaminated waters. All three problems may be significantly reduced in magnitude of hazard if the reclaimed waters are essentially free from pathogenic organisms. Absolute freedom from such organisms is difficult when domestic sewage is involved and probably in many cases is impractical to accomplish. Standards of secondary water quality are usually expressed in terms of coliform organisms, but it should be recognized that such standards will not provide absolute assurance of freedom of hazard from virus and protozoan pathogens. As a minimum, it would seem desirable that domestic sewage receive at least "primary" treatment followed by a reasonably effective "disinfection." Such disinfection will be more effective in controlling pathogens if the sewage being disinfected has received "secondary" treatment in the form of some sort of oxidation process.

Even with the highest degree of treatment, there must be certain limitations on kinds of uses of reclaimed water in industry if there is any remote possibility that the "raw" water carries any human wastes. For example, such water would not be acceptable for uses in the food processing industry.

It is not within the scope of this paper to give a dissertation on problems of cross-connection hazards and on methods of cross-connection control. Briefly, where a secondary, potentially hazardous water is piped around any premise, the possibility exists that accidental interconnections may be made between the domestic water system and the secondary water source. The degree of hazard depends upon the complexity of the piping arrangements, upon the management of the piping operations, and upon the effectiveness of protective measures such as good plans of piping, differential marking of the two piping

systems, and a good administrative control over manipulation of the piping systems. When secondary water systems exist, the cross-connection hazards must be recognized and dealt with intelligently and conscientiously.

Experiences in the past have demonstrated that unwitting use is sometimes made of water from the secondary water system by workers around the plant. Suitable means must be devised to meet this problem. Differential marking of pipes, adequate marking of the outlets by warning signs, and possibly, use of special control valves that can be operated only by certain personnel are some methods that may be employed to partially deal with this problem. The use of dye or taste producing substances such as phenols may also be utilized. Employee education should not be ignored as a further means of meeting the problem.

Worker contact with degraded waters will be different in various industrial operations. In some cases, there may be little or no worker contact. Water quality, in such case, may be established by the need to deal with the cross-connection and accidental use problems. In other cases, where there is relatively intimate worker contact with the secondary water supply, a higher quality of water should be maintained in the system, or in other words, more rigid bacterial standards should be met.

It is probable that significant increases will occur in industrial use of reclaimed waters. It is likely that such use will be made more by industries utilizing their own waste waters than by utilizing community domestic sewage. This appears to afford means of reusing substantial quantities of waste water and thereby accomplish a significant reclamation.

Secondary Domestic Uses

So-called "secondary" domestic uses, particularly toilet flushing, should be limited to cases where adequate controls can be maintained. Such secondary uses exist in certain instances in military establishments, such as the Marine Base at Twentynine Palms, California, and as noted above at Grand Canyon National Park. These secondary uses present public health problems primarily from cross-connections and accidental use of water from improperly identified piping. One reason why such

secondary uses have been limited to institutional type of facilities is because of the difficulty of adequately controlling the cross-connection problem on a community basis. Within institutions the problem of accidental use of water from the secondary system can be controlled if no taps are available for accidental use and water service is only to such devices as toilet bowls and urinals. In this case, as in the case of the industrial use, a minimum quality of water must be maintained for a satisfactory secondary line of defense in event of failure of the first lines of defense.

"Domestic" Irrigation

"Domestic" irrigation uses of reclaimed sewage present significantly different and troublesome public health problems, chiefly because of the greater opportunity for contact by the public with the waters themselves or with lawns and other grounds that have received applications of the reclaimed water. The degree of hazard through contact with irrigated lawns is difficult to assess, but prudence and aesthetics seem to dictate high levels of protection. In this case also, the

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cross-connection problem and the possibility of accidental use of water from the secondary piping system exist. In addition, the possibility of people being downwind from spray on golf courses and lawns is of public health concern. Without question, such exposures have resulted and can never be completely eliminated. This possible contact, as well as contact with the irrigated lawns and grounds, constitutes more serious exposure and therefore represents more serious hazards than the other two hazards. As a result, a higher standard of water quality and performance of operation will be necessary than for the uses previously described. An important consideration, in this case, relates to *reliability* of performance of the waste water treatment operation. Under ordinary circumstances of sewage treatment, reliability of treatment operation is considered desirable but not an absolute necessity. Where waters are reclaimed for this particular use, reliability of operation becomes a necessity if adequate public health protection is to be obtained. Reliability of operation may require installation of duplicate treatment equipment, high caliber operation, more specific controls, both laboratory and administrative, and "secondary" safeguards such as storage (e.g., 30 days or more) in advance of the use. Unless these safeguards can be provided and the cost of meeting them taken into account in assessing the economics of the operation, such projects should not be carried into operation.

Some further mention should be made of the public health hazard relating to exposure to sprays from sprinklers on lawns. Only very limited information is available concerning possible disease transmission from contaminated sprays. The California Department of Public Health demonstrated the presence of sewage organisms in the air in the vicinity of contaminated bay waters at time of wind and wave action in unpublished studies of 1939 and 1943. More recently, research workers at the University of Southern California have studied the matter and report their findings briefly in a recent publication.

Legal Aspects

Consideration of waste water reclamation will raise such questions as: How are legal rights to reclaim waste water acquired? Which public agen-

cies are empowered to reclaim waste water and make it available for reuse? What are the problems concerning liability for damages which may result from reuse of waste water? These questions were discussed by Adolphus Moskovitz, Deputy State Attorney General, in a paper presented at the Conference on Waste Water Reclamation at Berkeley in January, 1956.

Aesthetic Considerations

Investigators have pointed out that the public may object to certain waste water reclamation projects because of aesthetic objections to reclaiming sewage. In a current magazine article describing nationwide problems of water resources, the following statement is made: "Already many Americans are drinking what may be accurately—if disgustingly—described as treated sewage." This statement must certainly represent the opinion of a large segment of the American public. The experience at Chanute, Kansas, seems further to demonstrate that the public will not accept reclaimed sewage water for unlimited domestic purposes. The best way to meet aesthetic objections is probably to introduce a significant separation by time and distance between the reclamation operation and the "use" operation, regardless of the kind of use. If the public is unaware of the origin of some waters they will have no aesthetic objections, so long as the waters are not otherwise objectionable to their senses. Where the public is aware that reclamation is taking place, the developers of a project must create public confidence if there is to be acceptance of the proposed use. Public confidence is merited and may be commanded only when reclamation projects are developed along sound engineering lines. Projects must be conceived and planned by competent engineers having adequate knowledge of, and experience with, the engineering principles involved. In some projects, the scientific principles are well-established and reclamation projects may be carried on successfully, with no doubts about the projects. In other cases, the application of scientific principles is not fully established and development must come more slowly. There is an element of pioneering in reclamation projects and responsibility rests with those who would carry forward projects.

School Child Vision Screening Study Reported

The importance of good vision to the optimal development and education of all children is widely attested by the laws requiring periodic testing of school children. However, there has not been a really efficient method or, for that matter, even an acceptable definition of a vision problem. School districts throughout the country have been screening children by many different methods, some of which are not only expensive but almost worthless. Good methods are essential to effective execution of the vision testing laws. This has rarely been recognized and acted upon as by the authors of *Vision Screening for Elementary Schools*, a report by Henrik L. Blum, M.D., Henry B. Peters, M.A., O.D., and Jerome W. Bettman, M.D., recently issued by the University of California Press.

Faced with the need to test the vision of school children in his area, the Contra Costa County Superintendent of Schools sought advice from the county health officer who turned to ophthalmologists and optometrists at Stanford University and the University of California. All agreed that evidence of the efficiency of existing vision screening methods was inadequate, and the result was the unusual co-operative research undertaking reported in this new book.

Under the leadership of the county health officer, a dedicated interprofessional group designed and carried out a three-year comparative study of vision screening methods on more than 1,000 school children in Orinda, California. The study involved the co-operation and talents of parents, teachers, nurses, technicians, school and public health officials, optometrists, and ophthalmologists. The study received support not only from the Stanford University School of Medicine and the University of California School of Optometry, but also from the California State Department of Public Health and the Children's Bureau of the U. S. Department of Health, Education, and Welfare.

The Orinda Vision Study was notable for several reasons:

1. The major goal of this study was to design the least expensive, least technical, and most effective screening program for finding essentially all elementary

school children with vision problems. To do this it was necessary to go beyond previous studies by: defining what constitutes a need for professional vision attention—that is, to define “correct referral”; determining the prevalence of vision abnormalities and eye-health problems in the elementary school population; evaluating the effectiveness of different screening tests in identifying children with vision problems; comparing the costs of different screening tests; determining how often screening should be done and the optimal school grades for it; and by reaching agreement between members of the two eye-care professions, ophthalmology and optometry, regarding criteria for vision screening and establishing jointly recommendations for the use of school and public health personnel.

2. The study describes a testing procedure (Modified Clinical Technique) and suggests that further field testing is warranted by the demonstration of its superior efficiency and low cost. Such field testing should include the application of the administrative recommendations listed in the book.
3. The completeness of the report speaks for the success of a remarkable interprofessional approach to an important problem. Ophthalmologists, optometrists, schools, health departments meet on the common ground of concern for an efficient and effective vision screening program for children.
4. The importance of research as a function of official agencies asked to solve problems in areas of inadequate knowledge, and the value of utilizing resources for competent investigation are exemplified in this report. As an outstanding example of co-operative research involving a local health department in the United States, a presentation of the study was made at the American Public Health Association's meeting in 1958.

The ultimate success of this study depends on the extent to which those who read it can adapt the findings to

Death Ends Public Health Career Of Dr. Frederic M. Kriete

Dr. Frederic M. Kriete, Deputy Director of the California State Department of Public Health, died of cancer on July 25, 1959, at Mt. Zion Hospital in San Francisco. He was 46.

Dr. Kriete joined the department in 1947 as Chief of the Bureau of Maternal and Child Health. In 1950



DR. FREDERIC M. KRIETE

he was appointed Assistant Chief, Division of Preventive Medical Services and in July, 1957, was selected by Dr. Malcolm H. Merrill, Director of the Department, as his Deputy Director.

“In the 12 years Dr. Kriete served in California,” Dr. Merrill said, “he achieved the respect and esteem of all those who worked with him in areas of human endeavor. His keen sense of humor, his fine judgment, his humanity in all his relationships endeared him to his many associates and friends. His passing is a personal loss to all who knew him. He enriched the lives of all who were fortunate enough to have crossed his trail.”

Before coming to California Dr. Kriete was associated with the Utah State Department of Public Health as a consultant in pediatrics and later as

improve vision of children in their own community.

The book can be ordered from the University of California Press, Berkeley 4, California, at a cost of \$3.75 plus tax.

Director, Division of Maternal and Child Health.

Dr. Kriete was born in 1913 in Tokyo where his parents were missionaries. He was graduated in 1934 from De Pauw University in Indiana and received his medical degree from Rush Medical College, University of Chicago, in 1938.

He is survived by his wife, Lillian, and three children, Margaret, Karen and Michael, all of San Francisco; his parents, Mr. and Mrs. Carl D. Kriete of Claremont, California; a brother, Dr. Bertrand Kriete, of Los Angeles, and a sister, Margaret Gressitt of Honolulu.

Friends of Fritz Kriete are establishing, through contributions, a Kriete Family Education Fund for his three children. This is to express in tangible fashion the esteem and respect for him and for his rich contribution to public health. Contributions may be sent to Mr. Harry R. Pennel, American Trust Company, Berkeley Main Office, P. O. Box 244, Berkeley, California. Checks should be made payable to “Kriete Family Fund.”

Training for Nursing Home Aides Promoted by Red Cross

At the request of the U. S. Public Health Service, the American National Red Cross is undertaking the teaching of nursing aides who are employed in public, private, and non-profit nursing homes.

Members of the California State Health Department's Bureaus of Hospitals and Public Health Nursing participated recently in a planning meeting with Pacific Area Red Cross officials to initiate the training program in California.

Purpose of the program is to promote better nursing care for patient in nursing homes. The program will be of particular value in the small nursing homes where sufficient professional nursing time is not available to provide adequate teaching of nursing aides.

The Red Cross course, “Care of the Sick and Injured,” will be taught by authorized instructors in classrooms provided by local Red Cross chapters. Since the organization does not prepare people for jobs, the course will be offered only to persons already employed in nursing homes. The program has the approval of the Nursing Home Association.

Water Pollution Bill Signing Assures Improved Control

California is now assured of a stronger, more efficient and workable water pollution control program as a result of passage by the Legislature of Assembly Bill No. 1974, known as the Meyers Bill. The measure is designed to strengthen and clarify the authority of the State in establishing statewide water pollution policy.

Under the new policy, the utilization of water for waste disposal will be considered a privilege, not a right. This privilege is subject to control and regulation by the State, so as to maintain the quality of the water at the highest practicable level.

Departments of State Government who are members because of their direct concern with water supply and purity. They are the Directors of the State Departments of Public Health, Water Resources, Natural Resources, Fish and Game, and Agriculture. The measure also carried the approval of representatives of sportsmen, lumbermen, oil companies, manufacturers, and other business organizations, as well as waterworks agencies and numerous municipalities.

The bill states in part:

"The Legislature finds and declares that the people of the State have a primary interest in the control and conservation of the water resources of

where no pollution or public health menace is involved. An example would be offensive odor emanating from tide flats.

The second is where pollution occurs to a degree that water quality is impaired to the extent to make beneficial uses questionable.

The final situation is where industrial and sewage waste so far impair water quality as to menace public health through poisoning or spread of disease.

The nine regional pollution control boards will be expanded from five to seven members each, with one new member named by the Governor from a "responsible organization associated with both recreation and wildlife" and the second representing the public at large. The wildlife representative expressly cannot be a governmental employee. This expanded membership should make the regional boards more responsive to the viewpoint of the general public.

All dischargers of waste will be required to give their regional boards a report on the wastes they are discharging, with failure to do so a misdemeanor.

Local boards finding a deleterious condition may issue peremptory cease and desist orders without going through present qualifying hearings, and if these regional boards fail to act, the state board will be empowered to move in.

Refusal to comply with a waste discharge requirement constitutes a violation of the statute and will enable the regional board to apply to the district attorney for injunctive action, with further recourse to the Attorney General's office. Ignoring a court injunction would subject a defendant to criminal contempt of court.



Governor Brown signs the new Water Pollution Control Bill. Assemblyman Charles W. Meyers of San Francisco, principal author of the bill, is at his left. Representatives of the State Departments of Agriculture, Fish and Game, Natural Resources, Water Resources, and Public Health witness the signing. Frank M. Stead, Chief of the Division of Environmental Sanitation (at Mr. Meyers' left), represents the State Department of Public Health.

The keynote of the new law is prevention, always better and cheaper than abatement, and necessary to a successful water pollution control program. While the law emphasizes prevention, it also provides a more expeditious and efficient means of abating pollution in those cases where such action is necessary.

Assemblyman Charles W. Meyers of San Francisco, principal author of the bill, had as co-authors 22 members of an Assembly Interim Committee and 15 other Assemblymen who made a two-year study of water pollution. The legislation was based on recommendations from the State Water Pollution Control Board and particularly from the heads of the five de-

partments of the State and the prevention of damage thereto by unreasonable use."

It adds that because of widespread need for full use—domestic, irrigation, industrial and recreational—of available water resources, "it is the policy of the State that the disposal of wastes into the waters of the State shall be so regulated as to achieve highest water quality consistent with maximum benefits to the people * * * and shall be controlled so as to promote the peace, health, safety and welfare of the people of the State."

The new law leaves unchanged the definitions of the three situations subject to control.

The first is where a "nuisance" becomes offensive to the senses, but

Educational Distribution List Set Up for VD Materials

The Venereal Disease Branch of the U. S. Public Health Service's Communicable Disease Center announces the establishment of an Educational Distribution List of those interested in receiving copies of new VD educational materials routinely as they become available. For placement on this list write to VD Branch, CDC, 50 Seventh Street, NE., Atlanta 23, Ga.

Review of Cancer in California Issued by Tumor Registry

The California Tumor Registry has recently released a report on *Cancer in California*. This report provides information about the State's population, cancer deaths and illness, the concentration of certain forms of the disease in particular segments of the population, and the extent of survival among those affected by the disease. The information is derived primarily from three sources in the California State Department of Public Health: (1) Death Records, (2) the California Tumor Registry, and (3) Special studies on cancer conducted by the Bureau of Chronic Diseases.

Similar to the national trend, the California cancer death rate has increased considerably between 1910 and 1930 and leveled off between 1930 and 1956. In 1956, there were 19,377 deaths from cancer, with a death rate of 142.5 per 100,000 persons. Cancer has risen in relative importance as a cause of death. It was the sixth leading cause of death in 1910 and the second leading cause of death in 1956.

This increase in the cancer death rate does not hold for all population groups. There is considerable variation in the rate by sex. The male rate has risen while the female rate, in recent years, has declined. Much of this rise in the male rate is due to a great increase in cancer of the lung (10 per 100,000 males in 1940 to 30 in 1956), whereas a fall in the death rate for uterine cancer accounts for much of the overall decrease in the female cancer death rate.

An analysis of cancer deaths by age reveals that nearly two-thirds of all cancer deaths occur in persons between 45 and 74 years of age. While cancer is mainly a disease of older people, it also affects the younger population (1-34 years) where it is a leading cause of death.

There are a number of striking differences between the various ethnic groups in California for cancer of certain sites. Whether racial or socioeconomic factors determine these differences is not known. The Negro rate for cancer of the cervix is appreciably higher than that for the white group. In contrast, the breast cancer mortality among white women is nearly twice that of Negro women. The actual numbers of deaths among Chinese

due to cancers of the nasopharynx, stomach, and liver are several times greater than would be expected (based on cancer death rates for selected sites in the total population). Among the Japanese, deaths due to stomach cancer far exceed what would be expected. Mexican-born women show a threefold excess of lung cancer deaths compared with other women in the State.

It is estimated that about 50,000 new cancer cases are found each year in California. Some further indication of cancer morbidity is given by the type of case reported to the California Tumor Registry most frequently. Among men, skin cancer is most common, followed by prostate and lung cancer. (Skin cancer, however, accounts for only 2 percent of male cancer deaths.) Among women breast cancer accounts for about one-fourth of the cases reported to the registry. The uterus is the second most frequently reported site.

The possible association between lung cancer and certain occupations is an area of particular interest. A special study completed in 1953 revealed lung cancer to be frequently associated with certain occupations. A study based upon 70,000 workers (welders, asbestos workers, electric bridge crane operators, marine oilers, painters, commercial cooks, and printers), is underway in order to determine whether these findings can be substantiated.

The final portion of *Cancer in California* deals with the survival patterns of cancer patients. The survival rate of the proportion of cases alive at a given number of years after diagnosis is one of the chief indices for measuring the effect of cancer on length of life, and for gauging the effectiveness of treatment. Survival prospects vary significantly according to sex of patient, site of cancer and stage of disease. Survival for women is higher than for men—43 percent of women and 27 percent of men survive five years after diagnosis. Among cancers of different sites, breast and cervix cases have a relatively high survival—one-half of these cases survive five years after diagnosis. For cancer of the rectum this proportion is one-fourth; for stomach and lung cancers the five-year survival rate is very low, 8 percent and 5 percent respectively. Cases diagnosed in the localized stage of disease have a relatively good five-

Public Health Positions

Kings County

Director of Public Health: Salary range, \$849 to \$1,017. To be directly responsible to the board of supervisors for the operation of a staff of 24 to serve the county's population of 50,000. Requires at least three years' experience; valid license to practice medicine in California; M.P.H. preferred, but not mandatory. Provides vacation, sick leave, and retirement plan. No age limit has been set. Apply, giving qualifications, to Board of Supervisors, Box 707, Hanford, California.

Orange County

Health Educator: Salary range, \$516 to \$641. Position available September 1. Opportunity for participation in a generalized health education program. Requires M.P.H. degree. Apply to Personnel Department, County of Orange, 801-C North Broadway, Santa Ana, California.

Santa Barbara County

Public Health Analyst and Office Manager: Salary range, \$433 to \$527. Starting salary depends on qualifications and board approval. Combination position including general administrative responsibilities. Requires broad knowledge of public health, plus ability to analyze, interpret, and present data objectively. Contact Joseph T. Nardo, M.D., M.P.H., County Health Officer, P. O. Box 119, Santa Barbara, California.

Santa Clara County

Psychiatric Social Worker: Salary range, \$455 to \$553. Requires training and experience equivalent to completion of a two-year graduate curriculum in a recognized school of social work.

Sanitarian: Salary range, \$455 to \$553. Requires possession of or eligibility for certificate of California registration and State driver's license.

For either of these positions apply to W. Elwyn Turner, M.D., Director of Public Health, Santa Clara County Health Department, 2220 Moorpark Avenue, San Jose 28, California.

Santa Cruz County

Public Health Nurses: Salary range, \$412 to \$502. Two positions available in January, 1960. Contact Santa Cruz County Personnel Department, 105 Soquel Avenue, Santa Cruz, California.

Administrative Assistant: Salary range, \$478 to \$581. Requires equivalent of bachelor's degree, plus two years of administrative experience. Apply to Personnel Director, 105 Soquel Avenue, Santa Cruz, California or telephone GA 6-2220.

year survival prospect for certain sites such as breast (72 percent) and cervix (71 percent).

Particular attention has been directed in this report toward the study of cancer in various population groups in an effort to provide a differentiated and comprehensive view of cancer in California.

"Time and Two Women" Added to Film Library

A new American Cancer Society educational film, "Time and Two Women," 18 minutes, color, 1959, has been added to the California State Department of Public Health film library.

This film is designed for showing to women's organizations or groups, as part of the Cytology Education Program of the American Cancer Society. It is intended to be helpful in alerting women to their personal responsibility in seeking examination for early detection of uterine cancer. Dr. Joe V. Meigs, gynecologist, narrates the filmed experiences of two of his uterine cancer patients. Emphasis is placed on the importance of the pelvic examination and cell examination of vaginal secretions for uterine cancer as a part of the annual health checkup for all adult women.

Since the film can be shown only in those California counties in which medical groups have already approved the Cancer Society's Cytology Education Program, borrowers are requested to give the name of the county in which it is to be used. A physician must be present at all showings. Additional materials for audience distribution may be obtained from the local branches of the American Cancer Society. Requests for bookings should be addressed to the Film Library, Bureau of Health Education, 2151 Berkeley Way, Berkeley 4, California.

PHS Sets Up Research Program Among Southwest Indians

A health and medical research program among southwest Indians, to be centered in Phoenix, Arizona, has been recently established by the U. S. Public Health Service. Dr. Lynn J. Lull, who has been area medical officer in charge of the Phoenix Indian Health Area Office since its establishment in 1955, will devote full time to the new research activity. Dr. William S. Baum, who has been deputy area medical officer in charge, will succeed him as area medical officer.

Research in Indian health is being expanded in accordance with recommendations made last June to the Secretary of the Department of Health, Education, and Welfare by a group of nationally known medical authorities who served as consultants to the secretary in medical research and education. According to these authorities more information is needed about specific characteristics of the Indian population groups and cultural factors which influence disease trends in the Indians, and more needs to be known about factors which influence full acceptance by Indians of modern concepts of health and medical care.

Dr. Lull will investigate the processes through which health and disease patterns have developed among the Indians, and will evaluate present health services. He will work directly under Dr. James R. Shaw,

Four Deaths Stress Need To Vent Gas Heaters

The importance of properly vented gas heaters was emphasized again recently in the death of a family by carbon monoxide poisoning from fumes given off by a space heater in their home.

The heater in the small rental unit was provided with an adequate vent, but it had been plugged with steel wool in the expectation that the combustion products would pass through but the heat would be retained.

In reconstructing the incident, the State Health Department's Bureau of Adult Health engineers measured carbon monoxide from the heater at hourly intervals and found a gradual increase in the poisonous fumes.

Lack of oxygen is often wrongly blamed for deaths in which carbon monoxide was the agent. Insufficient oxygen may contribute indirectly by accelerating the production of carbon monoxide. If proper venting is provided so that carbon monoxide is exhausted to the outside, a dangerous condition can be eliminated.

To prevent illness and death from carbon monoxide fumes given off from gas appliances, the installation should meet the legal standards required by building codes. These standards include numerous provisions essential for the protection of health and safety of users of gas appliances.

Chief of the Indian Health Program in Washington, D. C.

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